

fields (e.g., date of incident, mode, name of carrier, name of shipper, commodity released, etc.). The data fields are further broken down by various codes including the following:

- 11,700 Companies (name, duns number, address, etc.)
- 1,400 Specific hazardous materials (e.g., gasoline)
- 328 Package types and specifications
- 27 Failure codes (e.g., dropped in handling)—of which only 15 actually appear on the report (the other 12 codes being inferred and assigned by MTB personnel)
- 25 Violation codes (e.g., driver not in attendance)
- 25 Significance codes (e.g., incidents involving 1-10 injuries)
- 35 Placard codes (e.g., empty)
- 21 Miscellaneous codes (e.g., vandalism suspected)
- 12 Restriction codes (e.g., removable head not authorized)
- 8 Type of Record codes (e.g., generic container type)

The 30 primary data fields on the incident report, plus the detailed and extensive data codes that have been applied to the reports, lead to an extremely vast and varied data base (e.g., the 30 primary data fields alone can be combined in 2.6×10^{32} or 260 million, trillion trillion ways). Even if a minute fraction of such combinations were analytically useful or meaningful, any attempt to analyze all of them would be very difficult, probably impossible, and in any case, enormously costly.

Several salient aspects of the existing hazmat data base are the following:

There were a total of 282 fatalities and 7,150 minor to severe injuries associated with the approximately 130,000 hazmat incident reports in the data base as of the beginning of 1983. Over the last three years, an annual average of 7,154 incidents, 8 fatalities and 172 injuries have been reported to the MTB.

Twenty-one percent of the 130,000 incident reports pertain to bulk packagings (e.g., cargo tanks, rail tank cars). Over the 12-year period, 1971-1982, hazmat incidents involving these containers resulted in 270 fatalities (95 percent of the total of all hazmat fatalities) and 4,305 injuries (60 percent of the total of all hazmat injuries).

Seventy-nine percent, or 102,700 of the 130,000 incident reports in the data base, pertain to small packages, such as bags, boxes, and drums. Of these 102,700 incidents, 84 percent are accounted for by only five DOT drum specifications, and seven generic or

general purpose packages (e.g., cans, jugs, and bottles) which can be used to transport hazardous materials not requiring a DOT specification package. Over the 1971-1982 period, reported incidents involving these small packages resulted in 12 deaths and 2,845 injuries. Seventy-six percent of all fatalities and 50 percent of all injuries have involved the following 12 selected hazardous materials.

Hazardous material	Percent total fatalities	Percent total injuries
Gasoline.....	40.2	4.9
LP-Gas.....	18.6	8.8
Anhydrous Am (NH ₃).....	5.7	6.5
Corrosive liquid NOS.....	2.7	2.9
Chlorine.....	2.7	5.5
Explosive, A.....	2.7	0.5
Flammable liquid, NOS.....	1.7	3.7
Sulfuric acid.....	0.7	8.5
Sodium hydroxide.....	0.7	3.0
Hydrochloric acid.....	0.3	2.1
Compound cleaning liquid.....		1.7
Poison liquid, NOS.....		1.5

It is MTB's belief that the continued augmentation of the existing data base under current requirements for incident reporting will not significantly increase an understanding of the causes, the nature, and the consequences associated with hazmat incidents. These incidents primarily pertain to incidents involving small packages.

This belief is based on, (1) the vast amount of data on small packages/containers already in the 12-year data base, (2) the diminishing marginal utility associated with the continued growth in the data base, rather than selective and judicious increases in the data base, in terms of the 30 primary data fields contained in the current incident report form, and (3) given the underlying millions of shipments, vehicle transit miles, and the varied nation-wide transportation environment, the fact that incidents involving small package/container of hazardous materials have been largely low consequences events.

Development of New Reporting Criteria

MTB has sought to develop alternatives to the current reporting criteria in terms of the following set of factors.

(A) Characterization of Hazmat Accident/Incident Event

- Type of Event (e.g., in-transit, loading/unloading)
- Type of Package (e.g., bulk/non-bulk)
- Type of Hazmat (e.g., flammable liquid, explosives, etc.)
- Mode (e.g., rail, highway, air, etc.)
- Severity of Event
- Frequency of Event

(B) Definition of Users

DOT/MTB

- Other Federal Agencies
- State and Local Governments
- Public Interest Groups
- Industry
- (C) Objectives of Users
- Public Safety
- Product/Container Performance
- Research and Development
- Determination of Liability
- (D) User Data Requirements

Analytic Purposes (e.g., human factor analysis, cause-consequence analysis, fault-tree analysis, procedures analysis, cost/benefit/risk analysis)

Programmatic and Policy Analysis (e.g., enforcement and compliance, regulatory development, package performance)

(E) Nature of Data Requirements To Meet Purpose (e.g., essential/non-essential, level of detail, usefulness, i.e., multiple/single purpose applications, utilization, i.e., actual/potential, non-duplicative)

(F) Methods of Data Collection (e.g., routine reporting, special studies/surveys, other data sources)

(G) Costs Incurred in Data Collection (e.g., industry, government)

The above factors are all interrelated and entail a large number of considerations. The following summarizes the review team's major findings concerning them.

In terms of the characterization of a hazmat accident/incident event: clearly, an event involving a hazmat accident/incident—e.g., a cargo tank spill during loading/unloading operations—can be described in an extremely large number of ways, and can serve to generate an enormous array of data such as time of day, weather conditions, age of driver, type of truck, type of valve, manufacturer of valve, age of valve, design characteristics of valve, location of incident, type of hazmat released, amount released, etc.

Further distinctions characterizing a hazmat accident/incident event are also possible and useful. One can distinguish between events in which a hazardous material is actually spilled and events in which a hazardous material package is involved, but no spillage occurs. The current reporting requirements of 171.16, for the most part, pertain to events involving the actual spillage of a hazardous material. An event of this kind is termed an "incident." An event involving a hazmat package (e.g., a gasoline cargo tank overturning) but not involving a spillage of a hazardous material is not required to be reported to MTB. It should be noted, however, that this does not necessarily mean that such an event is not reported to the Department